

This listing of claims will replace all prior versions, and listings, of claims in the application:

In the Claims:

1-22 (Canceled)

23. (Currently Amended) A system for controlling epileptic seizures comprising:

- a) a brain fluid pumping mechanism, having an input, coupled to a patient's brain for extracting brain fluid, and having an output;
 - b) a fluid ion adjustment mechanism coupled to said output of said brain fluid pumping mechanism, said fluid ion adjustment mechanism having an output from which modulated ion-content fluid is produced;
 - c) a catheter, having an input coupled to the output of said ion adjustment mechanism and having an output inserted into a predetermined region of a patient's brain; and
 - d) computer control that reads and executes stored program instructions that cause the pumping mechanism to pump the extracted fluid according to the program and measured electrical conductivity of the brain fluid to change the electrical potential difference across a nerve cell membrane in epilepsy generating brain structure by changing the ion concentration in the modulated ion-content fluid to increase the potential difference from -70 millivolts to -80 or more millivolts, and
 - e) ~~an electrical probe in the brain providing an electrical output related to measurement of an ion-concentration related brain parameter,~~
- ~~whereby brain fluid is extracted from a patient's brain, ion-concentration of said fluid is adjusted so that cells surrounded by the fluid will be hyper- or hypo-polarized and said brain fluid is re-injected into said brain, wherein the computer control adjusts the re-injection of the brain fluid by the brain fluid pumping mechanism based on the measured electrical conductivity of the brain fluid.~~

24. (Canceled)

25. (Currently Amended) A system as in claim 23 including computer control that reads the electrical output of ~~the~~ an electrical probe in the brain to responsively control fluid extraction or ion concentration.

26. (Canceled)

27. (Original) A system as in claim 25 in which the computer control calculates ion concentration in brain fluid using a membrane potential equation.

28. (Original) A system as in claim 27 in which the membrane potential equation is the Goldman equation or a derivative or a modification of the Goldman equation.

29. (Currently Amended) An apparatus for controlling epileptic seizures comprising:

- a) a fluid pumping mechanism, having an input, coupled to a fluid source selected from the group consisting of a patient's brain and a source other a patient's brain, and having an output;
- b) a fluid ion adjustment mechanism coupled to said output of said fluid pumping mechanism, said fluid ion adjustment mechanism having an output from which modulated ion-content fluid is produced;
- c) a catheter, having an input coupled to the output of said ion adjustment mechanism and having an output inserted into a predetermined region of a patient's brain, whereby modulated ion-content fluid can be injected into the brain; and
- d) means for measuring the electrical conductivity of brain fluid after the modulated ion-content fluid is injected into the patient's brain; the fluid pumping mechanism or fluid ion adjustment mechanism including means for adjusting the delivery of the modulated ion-content fluid, based upon the measured electrical conductivity of the brain fluid, said means for adjusting comprising computer control that reads and executes stored program instructions that cause the pumping mechanism to pump the extracted fluid according to the program and measured electrical conductivity of the brain fluid to change the electrical potential

difference across a nerve cell membrane in epilepsy generating brain structure by changing the ion concentration in the modulated ion-content fluid to increase the potential difference from -70 millivolts to -80 or more millivolts, whereby brain fluid is extracted from a patient's brain, ion concentration of said fluid is adjusted so that cells surrounded by the fluid will be hyper- or hypo-polarized and said brain fluid is re-injected into said brain, wherein the computer control adjusts the re-injection of the brain fluid by the brain fluid pumping mechanism based on the measured electrical conductivity of the brain fluid.

30. (Original) The apparatus of claim 29 wherein output of the catheter includes a fluid passageway to provide modulated ion-content fluid into the patient's brain into at least one localized region of the patient's brain.

31. (Original) The apparatus of claim 29 wherein the fluid pumping mechanism includes means for pumping the modulated ion-content fluid into the patient's brain according to a predetermined flow rate.

32. (Canceled)

33. (Original) The apparatus of claim 29 further comprising means for measuring ion concentration in the brain fluid after the modulated ion-content fluid is injected into the patient's brain.

34. (Original) The apparatus of claim 33 wherein the fluid pumping mechanism or fluid adjustment mechanism includes means for adjusting the delivery of the modulated ion-content fluid based on the measured ion concentration.

35. (Original) The apparatus of claim 29 further comprising:
means for calculating ion concentration in the brain fluid using a membrane potential equation;
the fluid pumping mechanism or fluid ion adjustment mechanism including means for adjusting the delivery of the modulated ion-content fluid based upon the calculated ion concentration.

36. (Canceled)

37. (Previously Presented) The apparatus of claim 29 wherein the means for measuring the electrical conductivity of the brain fluid after the modulated ion-content fluid is injected into the patient's brain comprises an electrical probe configured and adapted for insertion into brain fluid to measure conductivity or resistance of brain fluid.

38. (Original) The apparatus of claim 35 wherein the membrane potential equation is the Goldman equation or a derivative or modification of the Goldman equation. calculating the ion concentration of the brain fluid using the Goldman equation.

39. (Previously Presented) The apparatus of claim 29 wherein the fluid ion adjustment mechanism is adapted such that the modulated ion-content fluid injected into the brain produces a voltage differential between intra-cellular fluid and extra-cellular fluid that is modified to such a level that epileptic seizures are controlled.

40. (Original) The apparatus of claim 39 further comprising closed-loop feedback means for delivery of the modulated ion-content fluid to the patient's brain.

41. (Original) The apparatus of claim 29 further comprising means for measuring electrical activity of predetermined most likely epileptic brain cells, the fluid pumping mechanism or fluid ion adjustment mechanism including means for adjusting the delivery of the modulated ion-content fluid based upon measured electrical activity of predetermined most likely epileptic brain cells.

42. (Original) The apparatus of claim 29 wherein the catheter comprises a dispersed delivery system for injecting modulated ion-content fluid to the patient's brain.

43. (Original) The apparatus of claim 29 wherein the catheter is configured and adapted to provide the modulated ion-content fluid to a brain ventricle.

44. (Canceled)

45. (Original) The apparatus of claim 29 wherein the catheter is configured and adapted to provide the modulated ion-content fluid to the brain at a predetermined location by direct injection into a localized region.

46. (Original) The apparatus of claim 29 which the fluid ion adjustment mechanism includes an ion exchange mechanism to adjust fluid ion concentration.

47. (Previously Presented) The apparatus of claim 46 in which the ion exchange mechanism comprises a filter to adjust fluid ion concentration.

48. (Previously Presented) The apparatus of claim 46 in which the ion exchange mechanism comprises a chemical for treating fluid to adjust ion concentration.

49. (Currently Amended) Apparatus for treating epilepsy and other neurological disorders of the brain comprising:

means for modifying ion concentrations of a fluid to render modulated ion-content fluid using a predetermined process;

means for substantially continuously pumping the modulated ion-content fluid into a localized region of the patient's brain;

means for monitoring electrical conductivity of brain fluid proximate to the region; and

means for adjusting the delivery of the modulated ion-content fluid into the region of the patient's brain, based on the monitored electrical conductivity of the brain fluid, where the ion-content fluid is pumped to the patient's brain, said means for adjusting comprising computer control that reads and executes stored program instructions that cause the pumping mechanism to pump the extracted fluid according to the program to change the electrical potential difference across a nerve cell membrane in epilepsy generating brain structure by changing the ion concentration in the modulated ion-content fluid to increase the potential difference from -70 millivolts to -80 or more millivolts, whereby brain fluid is extracted from a patient's brain, ion-concentration of said fluid is adjusted so that cells surrounded by the fluid will be hyper- or hypo-polarized and said brain fluid is re-injected into said brain, wherein the computer control adjusts the re-injection of the brain fluid by the brain fluid pumping mechanism based on the measured electrical conductivity of the brain fluid.

50. (Canceled)